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REMARKS

The Examiner rejected claims 1-11 under 35 U.S.C. § 112, second paragraph. Applicant submits that the Claims as amended above are not indefinite. To the extent that the amendments above do not answer the Examiner's original objections to the claims, Applicant traverses this rejection.

First, the Examiner stated that Claim 1 is indefinite because the terms "$V_j(t)$", "$f_k(V, a^k)$", and "$I_k(t)$" are not described in the Claim language. Applicant disagrees. The term $V_j(t)$ is defined in Claim 1. It is the signal that modulates a carrier at ω_j that is input to the input port. Similarly, the term $I_k(t)$ is defined in the claim as the current leaving the output port at frequency ω_k. Finally, the claim defines $f_k(V,a^k)$ as an estimate of $I_k(t)$. In addition, Applicant submits that all these terms are clearly defined in the body of the disclosure, and need not be defined for a second time in the Claims. The term "$V_j(t)$" for example is explained in lines 1-4 on Page 4 of the Specification, the term "$f_k(V, a^k)$" is explained in lines 4-11 of Page 4 of the Specification, and so on. The usage of the terms in the Claims is consistent with their definitions in the Specification. Hence, Applicant submits that these terms do not render Claim 1 and the Claims dependent therefrom indefinite.

The Examiner states that Claim 1 is indefinite for the terminology "(V(t)" and "the set of values V" as "it is unclear whether this constitutes improper antecedent basis." Applicant submits that the term V(t) is clearly defined by the equation in which it appears. The above amendments replace "the" by "a", and hence eliminate any potential antecedent basis problem.

The Examiner states that Claim 1 is indefinite for the terminology "H" in the equation. Claim 1 has been amended to cure this defect.

The Examiner states that the scope of Claim 1 is indefinite with regard to whether the method generates a model of a circuit or, instead, "provide[s] a simulator component" as recited. Claim 1 has been amended to cure this defect.

The Examiner states than an essential step missing from Claim 1 is the method of "using said determined amplitude to determine values of a set of constants, a^k, such that a function $f_k(V,a^k)$ provides an estimate of the current..." as claimed. The Examiner states that the Claim language does not allow one to "use a determined amplitude" to "determine the values for a set of constants, a^k" as required by the Claim. Applicant respectfully disagrees. The claim contains two steps in this regard. The first determines an amplitude of a current leaving the output port at frequency ω_k when a signal comprising a modulated signal at frequency ω_j is input to the input port. In the second step, the amplitude determined in the first step is used to determine a set of constants such that the recited function provides an estimate of $I_k(t)$ when a different input signal is input to the input port. The claim is not required to recite all of the methods by which one can accomplish these two steps. The specification discusses those methods. The claim covers any method for accomplishing the steps, and hence, meets the requirements of 35 U.S.C. 112, second paragraph. The inquiry under the second paragraph of 35 U.S.C. 112 "is merely to determine whether the claims do, in fact, set out and circumscribe a particular area with a reasonable degree of precision and particularity" (*In re Moore*, 169 USPQ 236, 238). Hence, Applicant submits that Claim 1 does not omit an essential step.

The Examiner states that another essential step missing from Claim 1 is the connection between "determining an amplitude," and "using said determined amplitude to determine values for a set of constants," as compared to "providing a simulator component". Claim 1 has been amended to cure this defect.

The Examiner states that in the clause of Claim 1 "said component returning <u>a value</u> $f_k(V,a^k)$", the use of the article "a" rather than "the" or "said" does not refer back to the previously recited "function $f_k(V, a^k)$" leaving a "gap between the steps of "determining" and "using" as compared to the step of "providing"." Claim 1 has been amended to cure this defect.

The Examiner states that Claim 1 is indefinite for the use of the conditional language "when", because "the alternative embodiments defined by the claim language lack antecedent basis or are otherwise unclear". Applicant disagrees. The limitation involved with the first "when" in Claim 1 specifies the inputs to the circuit component that are used to determine the amplitudes. Applicant submits that what the circuit does in the absence of such inputs is irrelevant to the claimed operation of the present invention. The limitation involved with the

second "when" in Claim 1 specifies the conditions under which f_k provides an estimate of the current. Applicant submits that what the estimate does when a **different** signal is applied is also irrelevant to the claimed operation. The limitation involved with the third "when" in Claim 1 specifies what the component does when the circuit simulator provides a specific input. Once again, what the claimed method does when some other input is specified is irrelevant. The claim covers all methods that perform the claimed steps no matter what happens when different inputs are provided. Applicant submits that there is no requirement in the patent law or the court decisions that requires a claim to recite what an apparatus does under all possible conditions. Accordingly, Applicant traverses this rejection and submits that, as amended above, Claim 1 is not indefinite as defined in 35 U.S.C. 112, second paragraph.

Claim 11 has been amended similarly to Claim 1, to cure the defects of indefinite language discussed above. Hence, Applicant submits that Claim 11 is clear and definite.

The Examiner states that Claim 2 is indefinite for the language "wherein said simulator also returns $f_k(V,a^k)$ via said simulator output port <u>when said simulator provides values</u> for V". As noted above with respect to Claim 1, Applicant submits that the use of a condition to specify a limitation does not render that limitation indefinite.

The Examiner states that Claim 5 is indefinite because it is unclear how the limitation, "wherein the circuit simulator is a transient envelope simulator," limits the method of the parent claim. Claim 1 has been amended to cure this defect.

The Examiner states that Claim 6 is indefinite because it is unclear how the limitation "wherein $f_k(V,a^k)$ is evaluated by a neural network that was trained with a training set comprising the determined amplitude" limits the method of the parent claim. Claim 1 has been amended to cure this defect.

The Examiner states that Claim 7 is indefinite because it is unclear how the limitation "wherein "$f_k(V,a^k)$ comprises a weighted sum of basis functions" limits the method of the parent claim. Applicant must disagree. The Examiner's attention is drawn to methods for

approximating functions using a series of basis functions and to Eq. (3) in the specification. Applicant is not required to specify that which is well known in the art.

The Examiner states that Claim 8 is indefinite because it is unclear how the limitation "wherein $f_k(\mathbf{V},\mathbf{a}^k)$ further depends on an input derived from **V**..." limits the method of the parent claim. The Examiner states that in the parent claim, "there is no description of $f_k(\mathbf{V},\mathbf{a}^k)$ depending on anything." Applicant submits that it is inherent and would be generally understood that in the expression $f_k(\mathbf{V},\mathbf{a}^k)$, the function f_k depends on both **V** and $\mathbf{a}^k$. Examples of this aspect of the invention are provided on page 10 of the specification.

The Examiner states that there is insufficient antecedent basis for the limitation "said computational component" in Claim 9. Claim 9 has been amended to depend from Claim 8 rather than Claim 3, curing this defect.

The Examiner states that Claim 10 omits "the connection and/or relationship between the "circuit component" recited by claim 10 and "said computational component". The Examiner maintains that the "language of the parent claim 8 makes no reference to "said computational component" having any connection or relationship to a "circuit component". Applicant draws the Examiner's attention to the fact that Claim 8 defines a computational component and Claim 10 further limits that computational component by requiring that the computational component include a circuit component that is provided in a simulator library. Hence, Applicant can see no grounds for objection here under 35 U.S.C. 112, second paragraph. Accordingly, Applicant submits that Claims 2, 5-10 are clear and definite.

The Examiner goes on to argue that the claims encompass the admitted prior art while describing the disclosed invention when certain conditions arise. Applicant must disagree with the Examiner's interpretation of the claims. The limitations of the claims must be considered as whole.

The Examiner rejected Claims 1-11 are rejected under 35 U.S.C. § 101 because the claimed invention is directed to non-statutory subject matter. Applicant submits that the claims in question, as amended above, are directed to statutory subject matter.

Claim 1 is directed to a simulator component that receives an input comprising a modulated carrier from a circuit simulator and generates a signal value representing a signal from the simulator component to the circuit simulator. The signals in question represent physical quantities, i.e., voltages and currents.

The Examiner goes on to maintain that the claimed matter is not repeatable because of the use of the conditional language "when". Applicant must disagree. The claimed method performs the same way when the conditions specified occurs. Furthermore, Applicant is not aware of any authority for the proposition that a limitation that refers to a set of preconditions renders a claim unpatentable under 35 U.S.C. 101. Consider the case in which a circuit has two LEDs. A claim directed to a method of operating the device that recites the limitation "turning on the first LED when the second LED is turned off" is clearly directed to patentable subject matter. Similarly, the fact that a method for operating an apparatus when a first event occurs does not render the claim unpatentable because the first event may never occur.

Finally, Claim 1 has been amended to recite a method for operating a computer, and hence, limit the claim to a tangible computer system.

The Examiner rejected Claims 1-10 under 35 U.S.C. §102(a) as being anticipated by "New Techniques for Non-Linear Behavioral Modeling of Microwave/RD ICs-from Simulation and Nonlinear Microwave Measurements" by D. Root, J. Wood, and N. Tufillaro (hereafter "Root"). Applicant submits that the Claims, as amended, are not anticipated by Root.

First, Applicant submits that Root does not provide an enabling disclosure. The paper compares and contrasts a number of methods without providing detail that would allow someone of ordinary skill in the art to practice the methods in question. Hence, a rejection based on anticipation in view of Root is improper.

Second, the Examiner has the burden of showing by reference to the cited art each claim limitation in the reference. Anticipation under 35 U.S.C. 102 requires that each element of the claim in issue be found either expressly or inherently in a single prior art reference. In re King, 231 USPQ 136, 138 (Fed. Cir. 1986); Kalman v. Kimberly-Clark

Corp., 218 USPQ 781, 789 (Fed. Cir. 1983). The mere fact that a certain thing may result from a given set of circumstances is not sufficient to sustain a rejection for anticipation. *Ex parte Skinner*, 2 USPQ2d 1788, 1789 (BdPatApp&Int 1986). "When the PTO asserts that there is an explicit or implicit teaching or suggestion in the prior art, it must indicate where such a teaching or suggestion appears in the reference" (*In re* Rijckaert, 28 USPQ2d, 1955, 1957). Under the doctrine of inherency, if an element is not expressly disclosed in a prior art reference, the reference will still be deemed to anticipate a subsequent claim if the missing element "is necessarily present in the thing described in the reference..." Cont'l Can Co. v. Monsanto Co., 948 F.2d 1264, 1268, 20 USPQ2d 1746, 1749(Fed. Cir. 1991). "Inherent anticipation requires that the missing descriptive material is 'necessarily present,' not merely probably or possibly present, in the prior art." Trintec Indus., Inc. v. Top-U.S.A. Corp., 295 F.3d 1292, 1295, 63 USPQ2d 1597, 1599(Fed. Cir. 2002) (quoting In re Robertson, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999)). Applicant submits that the Examiner has not met this burden.

Claim 1 requires the determination of values for a set of constants $\mathbf{a}^k$, such that a function $f_k(\mathbf{V},\mathbf{a}^k)$ provides an estimate of the current $I_k(t)$, leaving the output port of a circuit at a frequency ω_k. when the signal V(t) recited in Claim 1 is input to the input port. The Examiner looks to the passage at page 89 entitled "ENVELOPE METHODS" as providing the required teachings. Applicant must disagree. The cited passage contains no teaching of the functional form of the $I_k(t)$. In particular, there is no teaching that these quantities are a function of the V_k and a set of constants $\mathbf{a}^k$. Furthermore, there is no teaching of a method based on determining an amplitude for a current leaving the output port at ω_k when a signal comprising a carrier at ω_j modulated by a signal $V_j(t)$ is input to said input port, wherein ω_k is a harmonic of ω_j. Hence, the Examiner has failed to point to any teachings that provide the first two limitations of the claim. Accordingly, Root could not anticipate Claim 1 or the claims dependent therefrom.

Claim 2 depends from Claim 1, and further requires that the simulator component also returns a value equal to $f_k(\mathbf{V},\mathbf{a}^k)$ via the simulator output port when the circuit simulator provides values for **V** at the first simulator input port for at least two values of k. The Examiner states that Root provides this teaching, and points to Figure 3 as "depicting a circuit

model with two input ports and two output ports". First, Applicant submits that the existence of multiple input and output ports is in itself irrelevant to the limitations of Claim 2. Second, at most the cited Figure appears to teach that two different frequency tones can be applied to two input ports in order to reduce measurement time. Hence, Applicant submits that the Examiner has not pointed to any teachings that satisfy the additional requirements of Claim 2. Accordingly, Applicant submits that there are additional grounds for allowing Claim 2.

With respect to Claim 3, the claim depends from Claim 1 and further requires that the determined amplitude is obtained by applying electrical input signals to the circuit being modeled and measuring a signal at the output port. The Examiner points to a statement in Root that models can be derived from real measurements made on the component. The issue is not whether one can derive models by applying real signals and measuring real outputs, but rather whether the reference teaches the specific method of determining an amplitude as defined in Claim 1. The Examiner has not pointed to any such teaching, and hence, Applicant submits that there are additional grounds for allowing Claim 3.

With respect to Claim 4, the claim depends from Claim 1 and further requires that the determined amplitude is obtained using a circuit simulator. The Examiner points to a statement in Root that models can be derived from simulations. The issue is not whether one can derive models using simulators, but rather whether the reference teaches the specific method of determining an amplitude as defined in Claim 1. The Examiner has not pointed to any such teaching, and hence, Applicant submits that there are additional grounds for allowing Claim 4.

Claim 6 depends from Claim 1, and further requires that the set of constants $\underline{\mathbf{a}}^k$ is evaluated by a neural network that was trained with a training set comprising said determined amplitude. The Examiner points to page 87 § 3.1 as providing the teachings. Applicant submits that the passage in question discusses the use of dynamic neural networks in electronic model training but does not teach their use to evaluate a function of the type required by Claim 6. Hence, Applicant submits that there are additional grounds for allowing Claim 6.

Claim 7 depends from Claim 1 and further requires that $f_k(V,a^k)$ comprises a weighted sum of basis functions. The Examiner points to pages 87-89, §§ 4-5 as providing the teachings. Applicant must disagree. First, it should be noted that the function $f_k(V,a^k)$ is an estimate of the current $I_k(t)$. Hence, the claim requires that $I_k(t)$ shown in Root be expanded as a weighted sum of basis functions. The cited passage provides no such teaching. Hence, there are additional grounds for allowing Claim 7.

Regarding Claim 8, the Examiner stated that Root discloses that $f_k(V,a^k)$ further depends on an input derived from V (page 89 §5) and wherein said simulator component further comprises a second simulator input port (Fig. 3) and a computational component. According to the Examiner, Root teaches that "*Cascadability means that the cascade of two behavioral models performs faithfully with respect to the performance of the cascade of the respective components*, and hence, the limitation is met.

Applicant must disagree with the Examiner's reading of Root. As noted above, since $f_k(\mathbf{V},\mathbf{a}^k)$ is an estimate of I_k, the cited passage would need to teach that I_k depends on $\mathbf{V},\mathbf{a}^k$ and an input derived from **V**. As noted above, Root does not teach a functional form for I_k, either at the cited passage or elsewhere. In addition, there is no teaching of a computational component as recited in Claim 8. Hence, there are additional grounds for allowing Claim 8.

Claim 9 depends from Claim 8 and additionally requires that the input to the simulator component that is generated by the computational component further depends on the time derivative of $I_k(t)$ for at least one value of k. The Examiner points to page 89, §5 and specifically to the statements that "*the coefficients of this expansion can vary in time... These time-dependent coefficients are the complex envelopes...*". Applicant submits that these statements in Root refer simply to the time dependence of the envelopes of voltage and current waveforms, and not to the dependence of a function $f_k(\mathbf{V},\mathbf{a}^k)$ on the time **derivative** of a current waveform, as required by Claim 9. Accordingly, Applicant submits that there are additional grounds for allowing Claim 9.

Claim 10 depends from Claim 8 and additionally requires that the computational component comprises a circuit component that is provided in a simulator component library.

The Examiner points to page 86, §2.2. The Examiner suggests that the passage means that a model could be put into a library or other storage and then retrieved to be used in a different environment. First, Applicant submits that the cited passage does not refer to a model being stored in a library or anywhere else. Second, even if it did, the claim requires that the computational component used in the simulator component be provided in a simulator component library. Hence, Applicant submits that there are additional grounds for allowing Claim 10.

The Examiner rejected Claim 11 under 35 U.S.C. §103(a) as being unpatentable over Root. Applicant traverses the rejection.

In making this rejection, the Examiner argues that Root teaches all of the limitations except for limitation that the circuit being simulated comprises P output ports. The Examiner goes on to argue that Root, in effect, teaches the case for P=1, and hence, it would be obvious to modify the teachings of Root to arrive at the claimed invention where P>1.

First, as noted above with respect to Claim 1, Applicant submits that even for the case where P=1 Root does not teach the Claim limitation requiring the derivation of values for a set of constants $\mathbf{a}^k$, such that a function $f_k(V,\mathbf{a}^k)$ provides an estimate of the current $I_k(t)$, leaving the output port of a circuit at a frequency ω_k.

Second, as noted above with respect to Claim 2, although the circuit that Root shows in Figure 3 has two input ports and two output ports, the only teaching given is that two different frequency tones can be applied to the two input ports in order to reduce measurement time. The Examiner has not pointed to any teaching that an amplitude for a current leaving **each** output port at the same frequency ω_k is determined, as required by the Claim.

Third, the passage to which the Examiner points regarding the advantages of envelope methods is a general discussion of these methods to model non-linear circuits. Applicant submits that it does not provide any motivation relevant to extending a single output port circuit model to a model with multiple output ports.

I hereby certify that this paper is being sent by FAX to 571-273-8300.

Respectfully Submitted,

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